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HISTORY OF OPHTHALMOLOGY IN MEXICO

Ophthalmology in the Codex De la Cruz-Badiano

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Introduction

The medical knowledge of humans in various cultures has been transmitted from one generation to another through songs, paintings and writings. Writings were captured on rocks, clay tablets and papyrus, among other materials, and was translated into the language of each civilisation. The Mesoamerican codices are on papyrus that discuss multiple rules for the benefit of the culture, science, religion, art, law and the customs of the region's civilisations.^{1,2}

The contribution that the Mesoamerican codices gives to all branches of knowledge, especially medicine, encompass records linked to prevention, diagnosis and medical treatment, as well as rehabilitation, of certain pathologies presented by the population of that time. This information was collected and brought back by the colonisers to be used in European medicine during the following centuries.³

In Mexico, several codices are known of that represent the pre-Columbian and colonial eras. These are a characteristic feature of the Mesoamerican culture, as they supplement the oral tradition thanks to their pictograms, ideograms and phonetic signs. The codices were produced on deer skin, imitating the materials used in the Old World. Amate paper acted as plant-fibre paper, which was used in the colonial era.¹

The Aztec codices illustrate the admirable life of ancient Tenochtitlan, with its inhabitant and customs, which include herbalism, medicine, astrology and many sciences that were practiced with astonishing talent. For their medical content, the Codex Matritense, the Florentine Codex and the Codex De la Cruz-Badiano stand out; the latter is one of the most

representative for world herbalism. It is a graphical collection on botany and traditional Mexican medicine used by the natives during the colonial period in New Spain. Thanks to its conceptual and historic patrimony, it has earned the prestige of being considered one of the masterpieces of universal medicine.⁴

Some of the elements of the Codex De la Cruz-Badiano are worth reviewing in order to gain a scientific perspective of the therapies used on the New Continent before the advances brought about by the Conquista, specifically the contributions that Aztec medicine could have had in the field of ophthalmology.

The Codex De la Cruz-Badiano

In the mid-16th century, the book also known as the *Libellus de Medicinalibus Indorum Herbis* (Little Book of the Medicinal Herbs of the Indians) was written by the doctor Martín de la Cruz, native of Xochimilco and student of the Real Colegio de la Santa Cruz de Tlatelolco, who had collected medical knowledge of great importance in the Aztec culture with the goal of documenting the medical herbs that later became the first book on indigenous Mexican medicine.⁵⁻⁷

This codex was first written in Nahuatl on 22 July 1552 and was later translated into Latin by Juan Badiano. It was originally requested as a gift to the emperor Carlos I of Spain (Charles V of Germany) by the Viceroy of New Spain, Don Antonio de Mendoza.^{4,8} This request is made clear in the prologue, where the author states: "I do not believe there to be

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another reason for which you ask me for this treatise on the herbs and medicine of the Indians, other than recommending them, even not being worthy of it".⁴

The son of the viceroy, Francisco de Mendoza, took the manuscript to Europe and delivered it to the emperor's successor, Felipe I, who left the Codex disregarded in the Royal Library, where it remained intact. In the 17th century it entered the collection of Diego de Cortavila y Sanabria, the pharmacist of King Felipe IV of Spain. From there it became part of the heritage of Cardinal Francisco Barberini, nephew of Pope Urban VII.⁶ In 1929, the North American historian Charles Upson Clark discovered the Codex in Rome, and 10 years later William Gates published it in English with the title *The De la Cruz-Badiano Aztec Herbal of 1552*. Demetrio S. García translated it into Spanish with the title *Libro de Yervas Medicinales de los Indios*. After many Mexican researchers worked on the manuscript, the Codex returned to Mexico in May 1990.^{6,9}

Aztec remedies in ophthalmology

Within the Codex De la Cruz-Badiano there is a chapter about ophthalmology entitled: "Curation of the eyes. Bloodshot eyes. Cataract. Stupor of the brows, or rather lids. Swelling eyes", which deals with pain and "heat" in the eyes, dry eye, chemosis, cataract (or pterygium), lagophthalmos, ectropion and blepharitis. As for the chapter on cataract, the description points more towards pterygium. I transcribe the text.¹⁰

Curation of the eyes

If to the eyes, when in pain, one applies for a time white frankincense and the dust of a powdered dead body, well ground in dragon's blood the white of the egg, they will be cured.

Overheated eyes

Into eyes much heated from sickness the ground root of this bush is instilled; let the face be further wiped with the squeezed juice of the bushes ocoxochitl, huacalxochitl, matlaxochitl and tlacoizquixochitl. Slightly troubled eyes are helped by the leaves of the mitzquitl tree and of the xoxouhqui matlaxochitl, macerated in woman's milk, or dew, or limpid water and instilled. One suffering from a defect of the eyes should abstain from sexual acts, the heat of the sun, smoke and wind, not use chilmolli as a sauce in his food, nor eat hot foods. On his neck he must carry a red crystal, and not look at white things, but black. The eye of a fox will help vitiated eyes wonderfully, being bound on the upper arm. If the eyes are so hurt that they look pulled out, pearls, reddish crystal, red mussels, the stone found in the small bird called molo-tototl, the stone tlacal-huatzin, and the stone in the stomach of the Indian dove, ground up in duck blood, woman's milk and spring water, should be taken; the juice thus prepared you shall instil into the effused eyes. When then something falls into the eyes, so that they fester from it, there should be instilled liquor prepared from ground siliqua or pulse, salt and flour, in spring water. If however the trouble comes from chill, it will be corrected if

reddish crystal be ground in Indian wine and the liquor dropped in the eyes.

Bloodshot eyes

This trouble is removed if the suffused eyes are sprinkled with powdered human excrement. Also by the same remedy ulcers on the eyes, white spots, blackness harming the eyes; the shell of a fresh egg with the yolk, pounded up and with ashes strained in pungent or acrid water, let stand for eight days and then instilled, is most efficacious.

Cataract

A carbuncle growing in the eye should be lanced, then drawn and extracted; the film should be sprinkled little by little with the ashes from human ordure with salt. Then on the following day the roots of our acid plants, first placed in the sun, should be pounded up and applied (Fig. 1).

Immobility of the eyelids

When the lids are drawn with numbness, that is, when the upper does not drop and the lower raises but a little so as not to meet the upper, the leaves of the malinalli rubbed on



Figure 1 *Ohuaxocoyolin*, herbal remedy used to cure cataracts. Figure represented on European paper and format, at a size of 20.6 × 15.2 cm. *Libellus de Medicinalibus Indorum Herbis*. Mexico, 1552. INAH [National Institute of Anthropology and History].

the lids are useful; after this nitre, salt, and powdered ordure should be sprinkled on them (Fig. 2).

Tumours starting on the eyes

The bushes *teztmitl* and *tequixqui-zacatl*, with the little stone, either white or reddish, found in the stomach of the swallow, ground up in the swallow's blood, stops or restrains swelling of the eyes and a heat-inflamed face.

Discussion

Aztec therapies, as all pre-scientific medicine, were empirical; their decisions took into consideration local gods, temperatures to which the body was exposed, and the stars. They were discovering and inheriting the curative power of the plants until consolidating the traditional Mesoamerican herbalism.^{11,12}

The Florentine Codex is another important Mesoamerican document on Aztec medical treatment.¹³ It was written by

Friar Bernadino de Sahagún and entitled *Historia General de las Cosas de la Nueva España* [General History of the Things of New Spain]. Its contents include specific therapies for conjunctivitis, keratitis, granulomatous conjunctivitis, leukoma, pterygium, myopia, dacryocystitis and amblyopia.¹³ In contrast, the Codex Badiano illustrates the herbal remedies. The method of preparing and applying the remedy is included in both codices.

It can be inferred from the descriptions that conjunctivitis and pterygium are diseases that appear in both codices.

For conjunctivitis ("Bloodshot eyes"), the Codex Badiano indicates pulverised human excrement while the Florentine Codex recommends, among others, black cherry bark, pulque, and milk from a woman who has just given birth.^{4,13} For pterygium, the Badiano orders cutting the fleshy growth and applying salt and excrement, while the Florentine instructs resecting it with a thorn and applying eye drops made of milk, herbs and roots.^{4,13}

The Florentine and Matritense codices, which also include therapeutic approaches in ophthalmology, are clearly distinguished by the precision of the indications of the Codex Badiano.⁴ On the basis of these contributions, the authors consider the Codex De la Cruz-Badiano to represent the main reference for Mesoamerican ophthalmology.

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Figure 2 *Malinalli*, plant used for lagophthalmos and ectropion. Figure represented on European paper and format, at a size of 20.6 × 15.2 cm. *Libellus de Medicinalibus Indorum Herbis*. Mexico, 1552. INAH [National Institute of Anthropology and History].